

# BURNETTIZING:

OR THE USE OF

## CHLORIDE OF ZINC

FOR PRESERVING

TIMBER, CORDAGE, CANVAS,

—AND—

COTTON AND WOOLEN FABRICS

FROM

WET AND DRY ROT, MILDEW, RAPID COMBUSTION, ETC.

*WITH TESTIMONIALS TO ITS EFFICACY;*

—ALSO,—

NOTICES OF THE USE OF CHLORIDE OF ZINC IN

DEODORIZING AND PURIFYING

VESSELS' HOLDS, CELLARS, SICK CHAMBERS, SINKS, VAULTS, ETC.

PRINTED FOR

LOVIS, HODGES & SILSBEE,

PROPRIETORS OF THE

MATTAPANNOCK CHEMICAL AND BURNETTIZING WORKS, SOUTH BOSTON.

OFFICE, 63 & 67 WATER STREET, BOSTON.

PRENTISS, SAWYER, & CO.'S PRESS.

1859.



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## ADVANTAGES OF BURNETTIZING.

### EFFECTS OF CHLORIDE OF ZINC.

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#### ITS EFFECTS ON WOOD.

It hardens and improves its texture. It enters into permanent chemical combination with the ligneous fibre; and does not come to the surface of the wood by efflorescence, like other crystallizable salts; and no amount of washing or boiling in water will remove the chemical compound so formed.

It preserves wood and other articles from the adherence of animal and vegetable parasites, and also from the attacks of insects.

It completely preserves wood from *wet* and *dry* rot.

It renders the wood un inflammable, when used of a certain requisite strength.

#### ITS EFFECTS ON CANVAS, CORDAGE, COTTON, &c.

The Preparation preserves these articles from mildew and rot. It renders them more pliable; does not in the slightest degree discolor them; and washing or boiling in water will not remove the combination from their fibres.

#### ITS EFFECTS ON WOOLEN.

Woolen prepared by this process will be preserved from mildew and rot; it will not be attacked by moths; and washing or boiling will not remove the combination from it.

#### ITS EFFECTS ON ANIMAL MATTER.

It is used for the preservation of anatomical subjects; and green hides are effectually preserved from decomposition, by being subjected to the process.

#### ITS EFFECTS ON BILGE-WATER.

It completely neutralizes the offensive effluvia arising from bilge-water on board ships.

#### ITS EFFECT ON METALS.

Iron or other metals are not oxidated or dissolved, either when immersed in the Solution, or imbedded in wood prepared in it.

## BURNETTIZING.

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When we consider the enormous consumption of lumber, with its great variety of uses and frequent exposure to the destructive action of moisture, heat, and imperfect ventilation, the importance of some process to preserve it from decay can hardly be estimated. The value of such a process is not simply in the cost of the material preserved, great as that may be. Its greatest economy consists in saving the expense of reconstruction, as well as the inconvenience and delay of frequent repairs. In bridges, railroad tracks, ship's timbers and spars, sills of houses, &c., the cost of replacing is much greater than the first cost of the lumber. It should be borne in mind, however, that many of the cheaper kinds of lumber, when Burnettized, are more durable and much cheaper than the more expensive woods unprepared.

In the case of bridges, another consideration deserves mention. Of the many terrible disasters occasioned by the giving way of these structures, under a loaded train of cars, most have arisen from the gradual and unnoticed decay of the timbers, which might have been prevented by subjecting them to the preserving process. As Burnettized stuff is also comparatively unflammable, another danger to which railroad bridges are exposed, that of taking fire by means of sparks from the engine, is greatly lessened. This last property entitles the process to a careful consideration of its utility in ships and steamboats, where portions of the timbers are extremely liable to take fire by the *continued* action of an elevated temperature from the heated machinery, boilers, and from other causes. The trifling expense of preparing the timber is of little account, when the question is one of even partially diminishing

the liability to the terrible consequences incident to the burning of a ship at sea.

Burnettizing also protects wood from the attacks of insects, which, in certain localities, are as destructive of the strength and durability of timber as the most rapid process of decay. The last named advantages, viz., rendering substances less inflammable, and protecting from attacks of insects, though not contemplated in the original claim of the inventor, are, nevertheless, of great importance, as some of the certificates in succeeding pages will show.

The chief object of this and other processes is the preservation of wood, cordage, canvas, &c., &c., from wet and dry rot and mildew. The importance attached to this, and the extent to which investigation and experiment have been carried, is shown by the fact that no less than forty-seven patents have been taken out for processes to secure this result, most of them within the present century. Of these, besides Burnett's, the most generally known and used, are probably kyanizing, and the ereasote or coal-tar process.

Kyan's process, patented in 1832, though attended with good results, is open to serious objections. Corrosive sublimate, or Bichloride of mercury, the substance employed, is very expensive; which is a sufficient objection to its general use. It is, moreover, a virulent poison, and the process requires several weeks for its completion. From the corrosive action of this substance upon most metals, it cannot be used in close iron vessels, the advantages of exhaustion and pressure are thus lost by which alone can timber be thoroughly impregnated and the process finished in a few hours.

The use of ereasote, as it exists in a crude, oily matter, distilled from coal-tar, — patented by Bethell, in 1838, — has met with considerable favor abroad, and is said to be effective. This, also, is expensive, even in England, where the substance employed is much cheaper than with us. It makes the timber very offensive and disagreeable to handle, and renders it highly inflammable, which are serious objections to its use above ground.

In 1838, a patent was granted in England to Sir Wm. Burnett, for the use of chloride of zinc in the preservation of certain animal and vegetable substances from decay. This process has been extensively used in England, and more extensively in this country than any other. The chloride of zinc has proved to be effectual, and has the advantage of being safe, cleanly, and economical, while at the same time it acts as a purifier.



Burnettizing was introduced in this country by James B. Francis, Esq., agent of the proprietors of the locks and canals on Merrimack River, at Lowell, Massachusetts. This Company, the original proprietors of all the water powers used by the extensive Manufacturing Companies of that city, have many uses for lumber in exposed situations, as in bridges, locks, dams, sluices, &c. Mr. Francis, their agent, a distinguished civil engineer, thoroughly examined the various processes for preserving timber, and in the course of his investigations visited some of the largest establishments abroad. Satisfied of the utility of the Burnett process, at his suggestion, and under his direction, the works at Lowell were erected. These works were put up solely for the use of the Manufacturing Companies, but finding they had sufficient capacity, large quantities of lumber have been prepared there for other parties.

*Memorandum on the Burnettizing Establishment at Gloucester, England, carried on under the direction of I. K. Brunel, Civil Engineer. By JAS. B. FRANCIS.*

In June, 1851, I visited an extensive establishment for Burnettizing timber, at Gloucester, which was in active operation preparing timber for railway purposes.

The timber in course of preparation was principally the white or Canadian pine, for the longitudinal sills, commonly used in England, for the continuous bearing of the bridge rail; the dimensions of the sills being thirty feet long, seven by fourteen inches.

There are, at this establishment, five cylindrical tanks of boiler iron, each about sixty feet long and six feet in diameter; narrow railway tracks are laid through the tanks, on which run small trucks on which the timber is loaded; several trucks are usually used for each charge. One head of the tank is entirely removed, when a charge is put in or withdrawn, and a man-hole through the other head gives ready means of applying a windlass for moving the loaded trucks.

After the heads are packed, a partial vacuum (usually from twelve to sixteen inches of mercury) is obtained, by means of air-pumps driven by steam power; this is maintained about twenty minutes; the dilute solution of chloride of zinc is then permitted to flow in; this occupies about eight minutes; the force pumps are then applied, requiring about fifteen minutes to get up the pressure, which was stated to be one hundred and twenty pounds to the square inch; this pressure is maintained until the timber has taken up thirty imperial gallons of the dilute solution to each load of fifty cubic feet, and requiring from two to four hours, — depending upon the size and state of dryness of the timber. It was considered important that all timber

in the same charge should be of nearly uniform size and dryness, as otherwise the smaller and dryer timber would take up an undue share of the solution, and leave the larger and less dry timber with less than thirty gallons to the load.

The quantity of solution taken up by the timber is ascertained by noticing the depths in the cistern from which it is pumped; after the pressure is once obtained, it is kept up until the proper quantity is taken up.

It was stated by the resident engineer, that the concentrated solution was purchased of the proprietors of Burnett's patent, at the rate of threepence sterling per imperial pint, each pint giving, on evaporation, one pound of dry chloride of zine. There was, also, usually paid a royalty of two shillings and sixpence sterling per load, for the patent right; but this was, of course, subject to special agreement. The concentrated solution is transported in jars of stoneware, holding seven gallons each; these are charged at five shillings sterling each, which is allowed, however, when they are returned. The strength of the dilute solution, as used, was stated to be one gallon of the concentrated solution to thirty gallons of water, for all timber prepared for the Vale of Neath Railway; and one gallon to forty gallons, for the timber prepared for the Oxford, Worcester and Wolverhampton, and the Oxford and Birmingham Railways. Omitting the small quantity of water contained in the concentrated solution, the dilute solution for the Vale of Neath Railway is two and two-thirds pounds of dry chloride to one hundred pounds of water, and, for the other two railways, two pounds to the hundred; and the amount of dry chloride taken up by the timber for the Vale of Neath Railway is about one-sixth of a pound to the cubic foot, and by the timber for the other two railways, about one-eighth of a pound to the cubic foot. If the concentrated solution is 55 per cent. dry chloride, this is 4.65 ounces of the concentrated solution to the cubic foot for the Vale of Neath Railway, and 3.49 ounces to the cubic foot for the others.

The process was all done by a contractor, who also owned the apparatus; every part of the process was, however, done under the immediate supervision of persons employed by Mr. Brunel; and, as far as I could judge, it seemed to be faithfully and thoroughly done.

It was stated that the contractor received sixteen shillings sterling per load of fifty cubic feet; which is equivalent to \$6.40 per thousand feet, board measure.

*Extracts from a paper recently read before the Society of Arts in England, on  
"Timber for Ship Building."*

"It appears that the aggregate tonnage of the merchant shipping of the United Kingdom was, last year, 4,325,242 tons; and that of the Royal Navy is certainly not less than 1,000,000 tons more. When we consider that a very large proportion of these vessels are built entirely of wood, and that, in twenty years at the farthest, these magnificent fleets will have fallen into decay and disappeared, we may well view with interest any attempt to



point out the means of increasing the durability of the materials of which they are composed. In addition to the demands made for timber for these purposes, it appears that *ten times* as much is required for the construction and repair of buildings, implements of husbandry, machinery, canals, docks, bridges, &c."

"The best of woods, when made into a ship, will exhibit decay much sooner than they should do. And why? In my humble opinion, it is because ship builders and ship owners will not adopt the simple but efficacious means which chemical science, confirmed by ample experience, offers them. Long years of practical experiment has shown that timber, however prone to dry rot or to wet rot, may be effectually preserved from both by the use of certain metallic solutions, or other suitable protective matters. These are all such simple, well known remedies, that almost everybody has heard of them, and yet it is positively true that neither the Admiralty nor the merchant-ship owner has yet built one single ship in which these principles have been intelligently and thoroughly carried out. A reasonable and an undoubtedly shrewd man of business will have a fine ship built, at a cost, perhaps, of £5,000, and yet he will not spend another £200 in rendering her timbers exempt from the attacks of insects and from rot."

F. Hewson, Esq., civil engineer, in an article published in the Journal of the Franklin Institute, advocates a process for saturating timber by capillary attraction, which, from its simplicity, is worthy of attention. From his interesting paper we extract the following:—

"The use of timber upon our railroads is considered indispensable; it is everywhere found in the substructure of our tracks, and forms the chief material of our bridges; its renewal is the most expensive item of repairs. The life of a sill seldom extends longer than eight years, and the rate of annual depreciation being  $12\frac{1}{2}$  per cent. can be applied to the estimate for the durability of the bridges and those structures which are unprotected against the assaults of heat and moisture, the active and unfailing agents of decay.

"The close of the first octennial period in the existence of a railroad track is marked by the entire renewal of its wooden superstructure, involving an additional expenditure for labor. Upon the 25,000 miles of railway lines in the United States, it is estimated that 3,125 miles of the timber superstructure of their track are annually renewed, requiring an outlay of \$3,500,000 to furnish the supply. Sir Wm. Burnett's process employs the chloride of zinc. It has been successfully tested on the Hanoverian and the Cologne and Minden lines, and has been used on the Oxford, Worcester and Wolverhampton, the Oxford and Birmingham, and the Vale of Neath railways. Brunel has taken an active part in its introduction on the public works of England. There has been a want of confidence relative to the treatment of timber by other systems."

Our apparatus was put up at the Mattapannoek Chemical Works, in South Boston, in the autumn of 1857, but was not used until the following spring. During the past season, we Burnettized nearly a million feet of lumber, chiefly for the horse railroads in this vicinity. The lumber for all of which roads is prepared by this process. We have also prepared lumber for a variety of uses, as piles, fences, sills, cellar floors, hydrant boxes, also for embankments, and some large bridge timbers.

Our apparatus, essentially the same as that at Lowell, consists of a cylinder of stout boiler iron, with heavy cast iron heads, and made to sustain a pressure of one hundred and fifty pounds to the square inch. It is sixty-one feet long and five feet diameter inside. One head swings on heavy hinges which admits of its being opened and shut conveniently. A railroad track runs the whole length of the cylinder and extends outside the same distance. On this track run two low carriages thirty feet long, each, which can be loaded separately, or united, if needed for very long timbers. These carriages are loaded outside, the lumber chained down to prevent floating, and rolled into the cylinder; the door is then closed securely upon a rubber packing. The air pump, worked by steam, is then put in motion, and shortly a vacuum of from twenty-three to twenty-eight inches of mercury is produced. This is maintained, by the continued action of the pump, from an hour and a half to two hours, according to circumstances. A large cock, in the pipe which connects the cylinder with the reservoir below, containing the chloride of zinc solution, is then opened, and the cylinder is quickly filled by atmospheric pressure. The cock is then closed. The air pump is kept in motion some time longer, to remove any air that may be contained in the solution, and to keep the pores of the wood thoroughly open, for its more perfect absorption. At a proper time, the cock in the air pipe is also closed and the pump stopped.

The lumber is then subjected to a pressure of 125 to 130 pounds to the inch, by means of a steam force pump, which is maintained for an hour or two, according to the size and character of the lumber. We exhaust for a greater length of time than is usually practised, as we consider this to be the most important part of the process. The pressure would be of little service, however great, unless the pores of the wood were previously freed of air and sap. At the

close of the above processes, the door is opened and the lumber removed.

Our works are situated upon tide water, outside all bridges, so that lumber vessels, not drawing over nine feet, can discharge there with ease, thus saving all cost of teaming.

The chloride of zinc is manufactured at our Chemical Works expressly for our own use, and is also supplied by us in any quantity desired, in the form of a concentrated solution.

For the convenience of the horse railroads, we put up the past season, machinery for planing and sawing and a machine for slotting the ties. We are able, therefore, to prepare the timber for these tracks in any desired form, and Burnettize without removing it from our yard.

The prices for Burnettizing are —

For spruce lumber, . . . .	\$5.00 per 1000 feet, board measure.
For all other kinds of lumber, . . . .	6.00 " " " " "
For spruce shingles, . . . .	.67 per 1000.
For other kinds of shingles, . . . .	.75 " "

Spruce is prepared at a lower price, as it absorbs less of the solution than pine or other lumber commonly used. Most of the lumber prepared at our works has been spruce, which is used altogether for the horse railroads in Boston and vicinity. This wood, which unprepared is extremely perishable, proves, when Burnettized, to be very durable. "The most remarkable instances of the preservation of wood by Burnettizing"—says Mr. Francis—"are in some of the woods which decay with such rapidity as to be almost valueless. Poplar, for instance, is useless in its natural state, as a fencing material. Trials at Lowell, however, show that, when Burnettized, poplar is a durable wood, and apparently as serviceable as chestnut, for posts."\*

Burnettized spruce, poplar, &c., can be used with as good results, to say the least, as the more expensive hard woods heretofore considered essential in exposed situations. Longer experience will probably confirm the opinion that they are much more lasting. The cost of prepared spruce, &c., is much less than the unprepared hard woods.

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\* See also the certificate of Mr. Stark, on page 14, in reference to White Birch.

It is best, when practicable, to use green or unseasoned lumber for Burnettizing, as the cells of the wood are then open and can be thoroughly impregnated with the Solution. With seasoned wood, there is more difficulty, as in drying, the wood contracts, and greater resistance is offered to the introduction of the liquid. In either case, however, the durability of the wood is materially increased. In addition to its other advantages, Burnettizing greatly diminishes the liability of timber to warp and "check," which have proved serious objections to the use of unprepared spruce, hemlock, &c., in situations where, when prepared, they are now largely employed. It is also claimed, and with reason, that the *wear* of timber is much improved from the increased density imparted by this process.

The only instance of apparent failure in Burnettizing that has come to our notice is in the case of a Bridge on the Boston and Lowell Railroad, which crosses an arm of the sea near Boston. "The superstructure of this bridge was rebuilt in 1850, principally of *second growth or sapling pine*; this is the white pine that has grown up rapidly on land from which the original growth has been cleared, and has a very large amount of sap wood. It was Burnettized at the Lowell establishment, but the sap wood has decayed to a great extent."

It would appear, therefore, from the above, that the process has not succeeded, as applied to *this particular kind of wood*. It seems not improbable, however, that the ill success in this instance may be attributable to some unknown cause, since the experience of the Lowell Bleachery gives sapling pine, Burnettized, as good a character for durability as other woods. (See p. 12.)

Lumber prepared at our works has not been in use long enough to enable us to give any testimonials of our own as to its durability. Our process is, however, the same as that in use at the Lowell works, which have been in operation for nine years. Of the results of Burnettizing there, important testimony has been given, which, by the kindness of Mr. Francis, we are permitted to make use of, together with other valuable information which he has taken pains to collect.

LOVIS, HODGES & SILSBEE,

*Proprietors of the Mattapanock Chemical and Burnettizing Works,  
South Boston.*



The following letter gives the valuable experience of Mr. STARK, in the use of Burnettized staff for Railroad Sleepers.

BOSTON & LOWELL AND NASHUA & LOWELL RAILROADS,  
MANAGER'S OFFICE, NASHUA, N. H., April 29, 1858.

Messrs. LOVIS & HODGES, South Boston.

GENTLEMEN,—In answer to your letter enquiring my opinion of the advantage of the Burnettizing process in its application to lumber, &c., I have to say that, my attention was called to the subject some years since, by the rapid decay of the wooden track ties upon our roads, and a careful investigation led me to recommend the construction of a small set of Burnettizing Works, for the express use of our Company. The works were constructed in 1854; since which, we have put down no ties in the Nashua and Lowell track that were not first prepared by this process, and I have seen no reason as yet to doubt the expediency of the measure. Our ties are mostly chestnut, but we have now in the track a considerable number of the more perishable kinds of wood, such as birch, maple, and all the varieties of oak, some of which, as the white birch and black oak, are known to be particularly liable to rapid decay when put into the ground in a natural and unseasoned state. A trial of four years shows even these perishable woods to be about as sound as when first put down. My observation on these and other specimens which have been experimented upon elsewhere, for a longer time, leads me to believe that Railroad Ties, properly prepared by this process, will not decay within the time required to wear them out by the cutting action of the rail. Or in other words, that the process adds not less than fifty per cent. to the life of a Railroad Tie, and probably a much larger per cent. to the life of some varieties of timber, where it is exposed to no other deterioration than natural decay.

Respectfully, your obedient servant,

GEO. STARK.

“Numerous statements of the effects of Burnettizing might be given. The following are mostly from persons well known in Lowell, who can be seen, personally, by parties interested. The most important statement, because based on the largest experience, is that from the agent of the Lowell Bleachery. This great establishment, where more than thirty millions of yards of cotton goods are bleached and dyed annually, has, on its premises, a great number of buildings, equivalent to a small town; and, from the nature of the processes carried on in them, large portions of the wood work are liable to very rapid decay, and the expense and interruption, arising from frequent renewals, have been very serious.



The experience of the last nine years, at this establishment, indicates that Burnettizing remedies the evil to a very great extent."

LOWELL BLEACHERY AND DYE WORKS,  
September 1, 1856.

DEAR SIR, — We have, since 1850, had about 800,000 feet of lumber Burnettized at your works. This we have used for walks, drains, runs, and buildings. Many of our rooms are wet and full of steam; and in them, boards, planks, and beams, not prepared by your process, decay very quickly.

Of the above amount of lumber received from you, — some of it in use now for six years, — we have not found one instance of rot, nor indeed any appearance of change. As special instances of the advantage of Burnettizing, our walks and dye-house floors are very striking. In 1850, we laid, of Burnettized hard pine, the chief portion of the walk, which leads, in the open air, from our bleachery to one of the dry-sheds, a distance of some two hundred feet. Out of the same lot of lumber used for this, we retained a portion, and laid it side by side with the Burnettized plank. The latter is now sound as on the day it was laid, while the former is wholly decayed.

Some years ago, we built a portion of our dye-house of Burnettized stuff; one year later, we laid a floor in a similar room of unprepared board; the former is perfectly sound, the latter has been entirely decayed for a year. Our ground walks, laid with common spruce, would not last two years; while one which we have laid in Burnettized spruce, has stood for six years, and shows no signs of rot.

We have had prepared by you, spruce and white, sapling, and hard pine, and as to freedom from decay, they are all alike, after a test of from five to six years. Maple we have also tried, but not long enough to know the comparative result. All the shingles and clapboards we use are Burnettized, and with the same favorable effect.

The advantages of this process have been, and are, to us very great, and we shall have much pleasure in showing to any, who may desire, the practical test of Burnettized lumber, as seen in our establishment.

I am, very respectfully yours,

F. P. APPLETON, *Agent Lowell Bleachery.*

To JAMES B. FRANCIS, Esq., Agent Proprietors  
of Locks and Canals, Lowell, Mass.

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LOWELL BLEACHERY AND DYE WORKS,  
May 2d, 1859.

DEAR SIR, — Since giving you an account, some two and a half years ago, of our experience in Burnettized wood, we have had nearly 200,000 feet prepared at your works. In every respect, the result has been satisfactory as before.

In regard to the lumber, which has been exposed on our walks and in our buildings — some of it for nine years, — I see no reason to change, in any way, the opinion I gave you in 1856. The wood looks as sound, and appears in every way in as good condition, as at first. In one instance, and in one only, have I found the least sign of decay. In taking down a portion of a walk, I noticed where some Burnettized pine plank lay on stringers not Burnettized, the latter being decayed throughout, that the plank, where it was spiked to the stringers, showed some symptoms of rot; this plank has been exposed seven years. In no instance, however, have I found spruce other than perfectly sound, and I think it would be hard to make a severer test of the worth of your process than we have given.

I should be glad to give more detailed information to any who may desire it, and am,

Very respectfully, yours,

F. P. APPLETON, *Agent*.

JAMES B. FRANCIS, Esq., Agent, &c.

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MERRIMACK PRINTERY, LOWELL,

September 9, 1856.

TO JAMES B. FRANCIS, Esq., Agent

Proprietors of Locks and Canals.

DEAR SIR, — The following comprises the results of Burnettizing, so far as timber thus prepared has been used in the print yard: —

1. WHITE SPRUCE, eight by eight inches; two sticks were framed as braces between two gate posts, and set with these in the earth in 1851. A few days since, the gate was removed. The spruce, down five years, is found perfectly sound. See samples in paper A.

2. WHITE PINE, old growth, formed the posts of the gate above, not Burnettized, and as perfectly sound; but WHITE PINE, second growth, Burnettized, and used as the bottom of a fence, and painted, is found at the end of five years *generally decayed on surface*. See samples, paper B.

3. CHESTNUT, Burnettized, stringers to the above fence, and painted, is found decayed where framed into posts of Burnettized CHESTNUT, (Paper C.) These posts are all decayed externally where buried. Down five years.

4. SUGAR MAPLE, old growth, and very large logs, used for rollers in washing machines and mangles. This timber, whether the bark is on or off, housed or exposed, decays in about two years, and is useless for the above purposes; if this same timber is Burnettized, it remains sound under the same circumstances an indefinite period; — our experience dates back to the time you commenced Burnettizing. Rollers of this timber decay not; un-Burnettized, they are kept from rotting by the various chemical agents with which they come in contact; rarely is a partial decay (and that on the end only) seen. The rollers wear out rapidly by attrition. If new rollers are made from Burnettized MAPLE, even the partial decay is prevented, and the wood is *condensed* and *hardened*, so that such rollers *wear* very much less, and their usefulness is preserved. In this view, Burnettizing is of the highest value.

I may add, that Burnettizing prevents neither decay nor the wearing effects of attrition, when used for mangle rollers, with hot starch.

With great regard, very truly yours,

SAMUEL L. DANA, *Chemist, attached to Merrimack  
Manufacturing Co.'s Printery.*

BOSTON & LOWELL AND NASHUA & LOWELL RAILROADS.

Manager's Office, Boston, May 2d, 1859.

DEAR SIR, — The Burnettizing Works, erected by the Nashua and Lowell Railroad Company, some five years ago, at Nashua, for the preparation of ties and other timber used upon their road, are still in active operation, and we are now enlarging the cylinder and tanks to a sufficient capacity for Burnettizing nearly all of the unseasoned timber required for use on our associated roads.

Our attempts to impregnate some kinds of seasoned timber have proved a failure, but I am fully satisfied that the cost of the process, when properly conducted upon green timber, is much more than repaid to us in the additional life of the wood.

We have some black oak ties in one of our tracks, prepared at your works about eight years ago, which are perfectly sound and apparently as good, excepting the wear, as on the day they were put down. Similar ties, in their natural condition, only last, on an average, five or six years.

Our own work has not yet stood long enough to be quoted as an example, except in one kind of wood. The common white birch is so extremely perishable, when exposed with the bark on, at the surface of the ground, that I have made use of it to test the efficacy of the process, putting down several hundred sticks, as ties, each year, commencing with 1854. The result is, that not one of them has shown the slightest symptom of decay. The first ones laid may be seen at any time in the track leading into our round house, at Nashua, and are easily recognized by the bark which still adheres to their sides.

Respectfully yours,

GEORGE STARK, *Manager.*

J. B. FRANCIS, Esq., Agent, &c.

LOWELL, April 19, 1859.

DEAR SIR, — In the Summer of 1852, we laid down a new floor in the cellar of Mr. Amos B. French, confectioner, 37 Central street, in this city. The under floor and joists were spruce, and, at our suggestion, Burnettized. The joists were bedded in the damp earth, leaving only about two inches of air space between the ground and the under floor. This space was not ventilated, and, in our opinion, if not Burnettized, this floor must have rotted so as to require renewal several years ago.

Our Mr. Peabody has this day seen part of this floor taken up for the purpose of examination; he found it in an exceedingly good state, consid-

ering the place; and although the sap of the joist is somewhat decayed, the floor is still strong and sound, and promises to last another seven years before it will require to be renewed.

This and other similar cases that have come to our knowledge has satisfied us that Burnettizing wood, which is to be used in places much liable to decay, is a very useful thing, and increases the durability much beyond the cost.

Respectfully yours,

FIFIELD & PEABODY, *Builders.*

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TO JAMES B. FRANCIS, Esq.

I fully agree with Messrs. Fifield and Peabody, in the statement relating to the floor in my cellar. Former floors in the same place have not lasted more than about three years; and the frequent repairs used to put me to great inconvenience and considerable expense.

AMOS B. FRENCH.

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J. B. FRANCIS, Esq.

DEAR SIR, — In answer to yours, with regard to the service of spruce Burnettized shingles, I would say that, in 1850, I used twelve thousand on my buildings, at the corner of Merrimack and Austin streets. I had previously used shaved pine, and was induced to try the Burnettized spruce, as a matter of economy, it being represented that they were more durable. In this, I have not been disappointed; for, on examination, this spring, I find them in a very satisfactory condition; particularly in places where they would naturally give out first, I find no sign of decay; and, with the exception of a few that were very shaky, they appear as sound as when first put on.

Yours truly,

JONATHAN JOHNSON.

LOWELL, April 21, 1859.

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LOWELL, April 22, 1859.

JAMES B. FRANCIS, Esq.

DEAR SIR, — The house, No. 25 Adams street, which I built in 1850, is mostly covered with Burnettized spruce shingles. I had not quite enough, and I used some pine shingles. I have just examined them and find the pine shingles much decayed, but I could find none of the spruce that are decayed. The adjoining house, which I built in 1849, was covered with spruce shingles, not Burnettized. I patched them up last year, they being very much decayed, and must be entirely renewed very soon.

Since 1850, I have used more than three hundred thousand Burnettized spruce shingles, and I am fully satisfied that the Burnettizing is a paying operation, as it makes a durable shingle out of an ordinary quality of spruce, which, without it, would hardly be worth putting on.

Yours respectfully,

WM. H. WIGGIN, *Builder.*

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SHAKER VILLAGE, N. H., April 27, 1859.

ESTEEMED FRIEND, — It is now almost seven years since we put in the Burnettized spruce timber and floor to our wash house; and, upon examin-



ing the same carefully, this morning, we can find no traces of decay. These timbers and floor are very much exposed to wet and steam—so much so that we have never been enabled to make a pine floor last but eight or nine years.

We have the greatest confidence in the success of Burnettized timber, and particularly of spruce, and cordially recommend it to all to adopt as real economy, particularly in all wet, damp places, and where steam is used.

We see no reason why our floor may not last for many years more. Enclosed we send you samples of the timber as it now is.

With perfect respect,

DAVID PARKER, }  
ROBERT SHEPARD, } *Trustees.*

JAMES B. FRANCIS, Lowell, Mass.

LOWELL, May 4, 1859.

JAMES B. FRANCIS, Esq.

DEAR SIR,—I take pleasure in expressing to you my very satisfactory experience as to the durability and value of Burnettized lumber. Ordinarily, in building, the timber most exposed is but a small part of the first expense; and when we consider the importance of preserving such, it is quite astonishing that the art of Burnettizing is so little known and appreciated by builders and mechanics. But so it is, as the rotten houses, bridges, and in fact everything built of wood daily testify; and men must be shown, by practical experiments, that it is a matter of dollars and cents, before it will receive that attention it deserves.

In the spring of 1851, I erected a building 40 by 28, in a situation where the timber of the lower floor was partially covered with water, for one half of the time at least, and also shut out entirely from any circulation of air. This I thought a good place to test the virtue of the art, and I sent the timber (which was green spruce) to the Company's Mill, and got it Burnettized; but by mistake there was a deficiency of about a dozen floor joist. This lack I supplied with seasoned timber, of larger size, and put it in the least exposed situation. This spring, (1859) I found a part of the floor giving way, and on taking it up, I found the timber, that was not subjected to the process, completely rotted away; while that which was Burnettized was not only perfectly sound but as bright as if it had been sawed out within thirty days.

Very truly yours,

J. F. MANAHAN.

The following are taken from the numerous English testimonials:—

*From S. M. Peto, Esq., M. P.*

3 GREAT GEORGE STREET, WESTMINSTER,  
8th January, 1849.

SIR,—In answer to your inquiry respecting some sleepers which were prepared for me by Sir W. Burnett's process, and which were laid down on one of the lines of railways executed by me in the year 1841, I have to



acquaint you they are now in as perfectly sound a state as when they were first laid, whilst those that were put down in juxtaposition with them at the same time, unprepared, are quite decayed.

I am, Sir, yours obediently,  
(Signed)

S. M. Peto.

To Lieut. JACKSON,

Secretary to Burnett's Patent.

*Extract from the "Builder," of the 2d May, 1846.*

The preservation of timber from premature decay is a subject which affects so large a number of our readers that we are bound to give the widest publicity to every invention that appears likely to effect that object. The various testimonials we have received in favor of Sir W. Burnett's process, and the time that has elapsed since the experiments were first made, lead us to entertain a very favorable opinion as to its efficacy, at all events, for a long period of time. The effects ascribed to it are, that it hardens and improves its texture. It enters into permanent chemical combination with the ligneous fibre, and does not come to the surface of the wood by efflorescence, like other crystallizable salts; and no amount of washing or boiling in water will remove the chemical compound so formed. It preserves wood and other articles from the adherence of animal and vegetable parasites, and also from the attacks of insects; and from *wet* and *dry* rot. Further, it renders wood unflammable, when used of a certain strength.

The basis of Sir W. Burnett's process is chloride of zinc, or as it is more commonly called, muriate of zinc, which seems to have a peculiar affinity to woody fibre, entering into intimate union with its component particles, and forming as it were a new mineralized substance. There is a chemical combination of the metallic base, not merely a mechanical alteration of the position of matter which might be again disunited. There is no decomposition produced, but the fibre of the wood appears to be permanently pervaded by the zinc, and the atoms of which they are formed enter into a new and fixed arrangement.

WELTON PLACE, NORTHAMPTONSHIRE,  
October, 1845.

DEAR SIR WILLIAM,—I am happy to send you an account of an experiment with the Solution, where it was put to a very severe trial. Some inch boards of elm, sawn up immediately upon being felled, were steeped in the Solution, and used to support the rich earth of a melon and cucumber bed constructed upon what is termed the "Tank System;" being subjected to the action of steam from a tank of hot water beneath, while they supported a body of highly manured earth, two feet in thickness. Other elm-boards were used, in part, in the same apparatus. These were of seasoned wood of high quality. On examining the apparatus in the present October, after being

seven months in action, the unprepared wood was permeated by the spawn of terrestrial fungi which were growing on the under side; they had also given way in the centre, so much so as to endanger the slate-covered tank beneath. The prepared boards were perfectly *straight*, sound, and unaltered.

I am, dear Sir William, very truly yours,

RICHARD TREVOR CLARKE.

Sir William Burnett, K. C. H., &c., &c.

PETWORTH PARK, 28th Nov., 1845.

SIR, — In answer to your inquiry as to my opinion of Sir William Burnett's process, I beg to inform you that, after two years' experience, I think so favorably of it, I propose using it on Colonel Wyndham's estate at Petworth more extensively than has been done hitherto.

I find it very useful for preparing oak, sap-rails, English fir, beech, and all timbers that are at all liable to be attacked by the worm.

As the time required for simple immersion in the Patent liquid could not generally be spared, Colonel Wyndham has had a hydraulic apparatus fixed at Petworth which will enable much larger quantities of timber being prepared; to which he now proposes to add a small steam-engine.

I am, Sir, your humble servant,

HENRY UPTON.

To C. JACKSON, Esq.

Secretary of Sir William Burnett's Patent.

*Copy of Report, dated Charleville Forest, Ireland, 12th January, 1843.*

SIR, — I have been using extensively, on the Earl of Charleville's Estate, Sir William Burnett's Patent Solution for the prevention of dry rot, &c., in timber, since June, 1840. All the timber so prepared has a very satisfactory appearance; I consider it quite as good for *seasoning* timber, and *preferable to the solution of corrosive sublimate for timber that is to be worked on the bench*; — it does not leave that gritty substance on the surface that is left from corrosive sublimate, which is so injurious to the plane-irons. I have also had a large quantity of small poles, or tops, prepared principally of Scotch fir, from one and a half to three inches in diameter, consequently they are nearly all sap. They have been in use about two years in what is commonly called American paling. I find, on examining them, that they are as sound between wind and water, as when put into the ground.

(Signed) R. TONE,

To the Secretary, Burnett's Patent.

Foreman to the Earl of Charleville.

WOOLWICH YARD, 15th July, 1841.

SIR, — Agreeably to your memo. of this day's date, we have to acquaint you that we have examined the several specimens of timber which have been

prepared by Sir William Burnett, and deposited in the fungus pit at this Yard, and find their state to be as follows, viz. : —

PREPARED.	UNPREPARED.
ENGLISH OAK. — <i>Perfectly sound.</i>	ENGLISH OAK. — <i>Has a small spot of fungus on the end.</i>
ENGLISH ELM. — <i>Perfectly sound.</i>	ENGLISH ELM. — <i>Doaty.</i>
DANTZIC FIR. — <i>Perfectly sound.</i>	DANTZIC FIR. — <i>Has fungus on the outside, and is decayed in the heart.</i>

We are, Sir, your most obedient servants,

O. LANG,

R. ABETHELL.

*Master Shipwright.*

*Assistant to the Master Shipwright.*

P. S. — The prepared and unprepared deposited in the pit the 25th August, 1836.

To Capt. SUPERINTENDENT HORNBY, R. N., C. B.

N. B. — Some pieces of prepared and unprepared canvas and calico were also placed in the fungus pit at the same time, and on its being opened in May, 1838, for the inspection of its contents, the Official Report stated that, as regarded the canvas and calico, the experiment was decisive and conclusive, the prepared being but slightly injured, and in some cases not at all, whilst the unprepared was entirely destroyed.

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ROYAL DOCKYARD, SHEERNESS,  
29th April, 1839.

SIR, — In reply to Sir William Burnett's inquiry relating to some pieces of wood prepared by him, and sent to this Yard to ascertain the effects produced on them when subject for a given period to a submarine immersion; and whether, during that immersion, any effect was produced by the preparation on the iron nails with which they were necessarily secured to the piles under water; I beg to state that it is my decided opinion the preparation on prepared pieces of wood has had no injurious effect on the iron nails by which they were fastened, nor does the preparation appear in any way to hasten the oxydation of the metal. I subjected two pieces of wood at the same time (and of the same kind,) one prepared, the other not, and, from a careful examination afterwards, I AM DECIDEDLY OF OPINION THAT THE PREPARATION DOES NOT HASTEN THE OXYDATION OF METAL, AND, ON COMPARISON WITH THE UNPREPARED PORTION, APPEARS TO RETARD IT.

THE WOOD WAS TWO YEARS SUBJECTED TO THIS EXPERIMENT.

I am, Sir, your most obedient servant,

J. MITCHELL,

*Civil Engineer.*

To Dr. WARDEN.

## PROTECTION OF WOOD FROM FIRE.

ADMIRALTY, 19th June, 1844.

SIR, — My Lords Commissioners of the Admiralty having caused experiments to be made to test the incombustibility of woods, when saturated in your Solution, I am commanded by their Lordships to acquaint you that it has been ascertained that the soft woods, such as yellow pine and other deals, both Foreign and English, saturated in Solution prepared in certain proportions, when exposed to the immediate contact of iron heated to a blood-red heat, did not at all ignite into flame; whereas, unprepared wood of the same kind burst into flame immediately.

The same effects, however, are not produced in the same degree by the same process upon the hard woods.

I am Sir,

Your most humble servant,

SIR WILLIAM BURNETT, K. C. II.

(Signed) JOHN BARROW.

ADMIRALTY, 14th August, 1845.

SIR, — In reply to your letter of the 9th instant, with its inclosure from Sir William Burnett, I am commanded by my Lords Commissioners of the Admiralty to transmit to you, for the information of Lord Stanley, a copy of a Report from the officers of Portsmouth Yard, upon the effects of his Solution applied to the purpose of preventing ignition in timber, or rather to prevent it breaking into flames. In consequence of that report, my lords have ordered the bulkheads in the holds and magazines in Her Majesty's ships to be fitted with timber so saturated, and it is also applied largely to the various buildings in Her Majesty's dock yards.

(Signed)

W. A. B. HAMILTON,

Geo. Wm. Hope, Esq., &amp;c., &amp;c.

*Secretary.*

SIR :

PORTSMOUTH YARD, 13th March, 1844.

With reference to your directions of the 1st ultimo, to make experiments as to the degrees of prevention against ignition into flame, which timber saturated with Sir William Burnett's Solution, affords comparatively with wood of the same kind and unprepared, we have the honor to state, that we have very carefully instituted a series of experiments on this subject, of which the following are the results.

[A portion of the experiments were made by placing the prepared and unprepared specimens in one of the furnaces of the metal mills, in which the results were decidedly in favor of the prepared woods, which resisted that intense heat much longer than the unprepared. The experiments were then continued as follows.]

Red Pine, (Canada) the red hot iron placed over both — the unprepared burst into flame immediately — the prepared gave no symptoms of flame, and the iron became cold without its inflaming.

Elm (Canada) placed in hot pots containing the copper cakes lately ladled out of the refining furnace. The unprepared ignited into flame in half a minute. The prepared into a very much smaller flame in two minutes and a quarter.



Yellow Pine (Canada) placed in the cake pots similarly to the before-mentioned. The unprepared burst into flame immediately. The prepared was watched for twelve minutes, but burst not into flame at all. The heat was very great.

A second experiment was tried on this timber by placing red hot iron on it. The unprepared ignited immediately into flame. The prepared not at all.

It appears from the above experiments, that some of the prepared woods (especially the Canada Yellow Pine) have resisted ignition into flame to an extraordinary degree.

We are of opinion that Yellow Pine Timber prepared in this way might be used most beneficially, not only for magazines and light room bulkheads, but also for all the bulkheads of a ship. There appears to be nothing in the Solution calculated to injuriously affect the health of the crew, and if, by preparing Yellow Pine Timber in this way, it might be made as durable as the timber generally used for bulkheads, it would be found to possess the double advantage of preserving the timber and prevent its ignition into flame. The solution used in the above experiments was about eight times the ordinary strength. We remain, &c.

(Signed) R. BLAKE. J. WATTS.  
F. STURDIE. J. OWEN.

PORTSMOUTH YARD,  
25th May, 1845.

SIR, — With reference to your memo. 20th March last, directing me to report whether we propose that bulkheads should be prepared with Sir William Burnett's Solution of the same strength as that used in the experiments described in our letter of the 16th March last, that is, eight times the usual strength, and if so, what would be the expense of fitting a line-of-battle ship in that manner.

The following is the comparative expense of fitting the bulkheads of the hold of a line-of-battle ship with ordinary timber unprepared, and with Yellow Pine and Riga Fir, prepared with Solution of one pound of Chloride to two gallons of water.

Bulkheads, &c. in hold, of English oak, 3 in. thick,	£	s.	d.
2,760 cubic feet,	968	0	0
Do., Yellow Pine, 3 in. thick, 2,760 cubic feet, including cost of preparation,	577	18	0
Difference in favor of Yellow Pine,	£388	2	0
Bulkheads, &c. in hold, of Riga Fir, 3 in. thick —			
2,760 cubic feet, including cost of preparation,	646	18	0
Difference in favor of Riga Fir,	£319	2	0

We have, &c., &c.

(Signed) R. BLAKE. J. WATTS. J. OWEN.



*Chemical Analyses of, and Experiments on, various specimens of  
Burnettized Timber.*

From Thomas Graham, Esq., M. A., F. R. S., L. and E., Professor of  
Chemistry, University College, London.

After making several experiments on wood prepared by the Solution of chloride of zinc for the purpose of preservation, and given the subject my best consideration, I have come to the following conclusions :—

The wood appears to be fully and deeply penetrated by the metallic salt. I have found it in the centre of a large prepared paving block.

The salt, although very soluble, does not leave the wood easily when exposed to the weather, or buried in dry or damp earth. It does not come to the surface of the wood by efflorescence, like the crystallizable salts. I have no doubt, indeed, that the greater part of the salt will remain in the wood for years, when employed for railway sleepers or such purposes. This may be of material consequence when the wood is exposed to the attacks of insects, such as the white ant in India, which I believe would be repelled by the poisonous metallic salt.

After being long macerated in cold water, or even boiled in water, thin chips of the prepared wood retain a sensible quantity of the oxide of zinc ; which I confirmed by Mr. Toplis's test, and observing that the wood can be permanently dyed from being charged with a metallic mordant.

I have no doubt, from repeated observations made during several years, of the valuable preservative qualities of the Solution of chloride of zinc, as applied in Sir W. Burnett's process ; and would refer its beneficial action chiefly to the small quantity of the metallic salt which is permanently retained by the ligneous fibre in all circumstances of exposure. The oxide of zinc appears to alter and harden the FIBRE of wood, and destroy the solubility, and prevent the tendency to decomposition of the azotized principles it contains, by entering into chemical combination with them.

(Signed)

THOMAS GRAHAM.

University College, 25th Oct., 1845.

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*Extract from " Illustrations of the Theory and Practice of Ventilation, &c., &c." By D. B. Read, M. D., F. R. S. E., late Vice President of the Society of Arts for Scotland, and Senior President of the Royal Medical Society, Edinburgh. (Pages 73, 74 ; subject, Dry Rot.)*

In all cases where there is either peculiar exposure, a difficulty in obtaining constant and free access to timbers, or a desire to give the highest protection, the materials should be subjected to those agents whose antiseptic powers tend to oppose all incipient vegetation. Among these the muriate of zinc, introduced by Sir William Burnett, which I have used on different occasions, and which, from the specimens I have seen, is the most powerful of those materials that do not affect the texture or other qualities of the wood.

Many oily antiseptics, though offensive from their odor, are also effectual in preventing Dry Rot ; but, as yet, I have not seen any specimens of wood or canvas that have resisted such trying circumstances as those that were protected by the muriate of zinc.

## TESTIMONIALS

AS TO THE PROTECTION OF CANVAS, CORDAGE, COTTON, &c.  
FROM DECAY AND MILDEW, AND WOOLEN FROM MOTHS.

*To the Proprietors of Sir William Burnett's Patent.*

ALBANY ROAD, 17th August, 1842.

GENTLEMEN, — My first series of experiments on the effects of the chloride of zinc upon fibrous substances, was directed solely to the object of affording ocular demonstration that some *permanent chemical change* in the fibres of the material submitted to its action was brought about by immersion in the Solution. Of the results of these trials, I had the honor to transmit you specimens, which were, I believe, amply sufficient to convince any unprejudiced observer. Since then, I have, for my own satisfaction, made some few experiments, with a view to determine the *preservative power* of the chloride, under circumstances likely to give considerable confidence in the permanency of the salutary change operated upon the organic structure. I took two separate pieces of the same woollen cloth, one of which had been immersed for forty-eight hours in the solution of chloride of zinc, then dried, and afterwards washed in cold water; the other piece in its ordinary unprepared state; both were then subjected to a similar process of dyeing, in the course of which operation they both *remained in the boiling fluid* for some time — say twenty minutes. The two pieces were subsequently buried in the earth of a melon-frame, and taken thence at the end of fourteen days. The unprepared piece was in a state of complete decay; the prepared piece retained its original strength of texture and color. These specimens were placed in your hands. I have now the pleasure of sending you two pieces of sail-cloth, which have been treated in the same way, and with similar results. The time they remained in the earth was three weeks.

These experiments will, I conceive, go very far to remove any doubts which might be raised as to the *permanency* of the preservative power of chloride of zinc on animal and vegetable fibre; since the boiling in the dye-vat, subsequently to preparation, may well be supposed to have removed from the cloth whatever was left soluble in water, by the previous maceration in the dissolved chloride.

In my own mind, not the smallest doubt exists that a permanent chemical union takes place, as I have before intimated, between the organic fibre and the metallic base of the salt; and that to such union must be ascribed the new power, now so frequently and so satisfactorily ascertained, of resisting decomposition under circumstances well known to induce the premature decay of animal and vegetable fibrous structures.

I have the honor to be, gentlemen, your very obedient servant,

CHARLES TOPLIS.

ADMIRALTY, 13th July, 1840.

SIR, — With reference to your letter of the 29th of last month, I am commanded by my Lords Commissioners of the Admiralty to acquaint you, that from the report of the trials of the strength of the Cordage and Canvas prepared with the Solution on your plan, as compared with that unprepared, *it appears that after both were equally exposed to wet and damp, as well as to the effects of the atmosphere, the prepared Cordage is on the average about one-twelfth stronger,\* and the Canvas about two-thirds stronger than the unprepared.*

I am, &amp;c., &amp;c.

H. E. AMEDROZ,

Sir WILLIAM BURNETT, K. C. H., F. R. S., &amp;c., &amp;c.

Pro-Secretary.

PORTSMOUTH YARD, 24th June, 1840.

To the Admiral Superintendent.

Suspended by weights, canvas No. 3. Immersed in the Solution two pieces prepared, and two unprepared, which had been placed in a damp cellar for twelve months; when tested, broke at the undermentioned weights:

Prepared.		Unprepared.	
Pieces laid open.	Pieces rolled up.	Pieces open.	Pieces rolled.
Weft	Weft	Weft	Weft
broke at 414 lbs.	broke at 505 lbs.	broke at 197 lbs.	broke at 267 lbs.

Two pieces exposed on the Sheers.

Prepared.	Unprepared.
Weft broke at 293 lbs.	Weft broke at 266 lbs.

From the foregoing trials of strength, I am induced to suggest, that it would be beneficial to Her Majesty's service, were all cordage, canvas, &c., especially that for store at home, or for Foreign service, dipped in this Solution, as it appears in every instance to preserve the articles from the effects of damp, mildew, and premature decay.

I am,

F. W. R. SADLER,  
Master Attendant.*From the late Joseph Somes, Esq., dated London, Nov. 29, 1843.*

I hereby certify that I have had upwards of 24,000 yards of "Burnettized" canvas in use, as awnings and sails, on board my ships, in all quarters of the globe — the greater part of which have been in wear more than three years, in India and China; and I find, on their return to this country, that they are invariably free from mildew, and, comparatively, in a good state of preservation. Having experienced such beneficial results from the adoption of Sir W. Burnett's process, I shall use it more extensively, and recommend it with the greatest confidence.

(Signed)

JOSEPH SOMES.

To the Secretary of Sir W. Burnett's Patent.

\* The Cordage, in this instance, was submitted to the Solution as Rope, *previously tarred*; — condition in which Cordage cannot derive the full benefit of the Patent.

We, the undersigned, Captain and Officers of the Niger expedition, on board the Wilberforce, having paid attention to the general wear and condition of the sails, awnings, and tents, supplied the vessel, which had been subjected to Burnett's Patent preservative process, feel pleasure in testifying to its efficacy; the canvas, generally, having been greatly exposed to tropical rains and a vertical sun, and notwithstanding that provided by contract to the ship was of a much lighter description than that issued in the Royal Navy.

The rain awnings would appear to be made somewhat water-proof by the preparation, as they are less pervious to rain than common canvas, and are likewise more flexible and tougher than that which has not undergone the process.

We are also most decidedly of opinion that the Patent is a perfect preservative against mildew and rot, as is manifestly shown by the present condition of the sails and awnings, they being still good and serviceable; which would, in all probability, had they not been "Burnettized," have become rotten and useless.

Given under our hands, on board the Wilberforce, at Cape Coast Castle, this 29th day of March, 1842.

WILLIAM ALLEN,	Captain and senior Officer present of the Niger Expedition.
WILLIAM ELLIS,	Commander of H.M.S. Soudan.
WILLIAM FORSTER,	Master of H.M.S. Wilberforce.
M. PRITCHETT, M. D.,	Surgeon of H.M.S. Wilberforce.

*Letter from Captain W. Cook, one of the Commissioners appointed by Government for conducting the Niger Expedition.*

H. M. STEAMER WILBERFORCE AT SEA,  
5th April, 1842.

DEAR DOCTOR, — In compliance with your request, I herewith give you my opinion as regards Sir William Burnett's Patent composition for preserving canvas, &c. I do this the more readily, because I have narrowly watched its effects upon the sails of this vessel, during the last twelve months; and I have no hesitation in asserting that, but for the Patent composition, they would long since have rotted from the yards. In confirmation of this, I may state that during the late rainy season, when there was so much sickness on board, I have frequently known the sails to have been rolled up to the yards for many days together, without an opportunity of airing or drying them.

Under the same circumstances, sails made of the best bleached eoker canvas, without the composition, would have been destroyed; whereas these sails, though not originally of the best sail-cloth, are still bent and in constant use, without exhibiting the least signs of mildew.

I remain, my dear Sir, yours faithfully,

M. PRITCHETT, M. D., &c., &c.

W. COOK.



12 NORTHAMPTON SQUARE, ST. JOHN'S STREET ROAD,  
LONDON, Dec. 1844.

SIR, — In reply to your inquiry as to how far the sails, awnings, &c., prepared by being steeped in your Patent Solution were preserved thereby, I beg to state that during the two years I commanded H. M. Steam Vessel *Albert*, I had many opportunities of testing its effects, and found in all cases the result to be very satisfactory.

The awnings prepared by you were subjected to every alteration of atmosphere, being kept spread night and day, both in the dry and rainy seasons (which I considered to be the severest test to which they could have been subjected.) These awnings lasted, at least, twice as long as it is possible for unprepared canvas to have done under the same circumstances; and they, when worn out, presented as white and unmildewed an appearance as they did when first put on board. The sails, also, which were frequently many days together wet through without being loosed (owing to the incessant rain,) never became either mildewed or warm, while a top-sail, made at Ascension of unprepared canvas, became black with mildew from head to foot. In fact, the prepared sails when repaired with new canvas presented, after a short exposure to the rain, a chequered appearance, owing to the new canvas becoming warm and turning black. A new unprepared quarter-deck awning, supplied by H. M. Steam Vessel *Kite*, was worn out in fourteen months, while a main-deck awning much worn in the NIGER EXPEDITION was subsequently used by me for twenty months, and then became unserviceable almost as much from its being cut up with shot, and torn by being kept spread in tornadoes, to preserve the health of the people, as from its natural decay; this awning must have been in use for nearly thirty months, being constantly spread and exposed to rain, sun, and damp. This, I think, is as satisfactory a test of the efficacy of the Solution as can be wished.

I think it necessary further to state that the process gone through does not in any way thicken the cloth, or render it difficult to handle, it being as soft and pliable, in fact rather more so than unprepared canvas. In conclusion, I should certainly say that a great saving is effected by your invention; and its adoption by vessels, especially those employed in the *African* trade, would be of incalculable advantage to them.

I have the honor to be, your very obedient servant,

(Signed) MACKLEOD B. COCKRAFT, *Lieut.*

*Late commanding H. M. Steam Vessel Albert, on the West Coast of Africa.*  
To Sir W. BURNETT, K. C. H., &c., &c., &c.

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SOUTHAMPTON, December, 1841.

SIR, — I beg to inform you that having, in compliance with your request, subjected a slip of canvas three feet long and four inches wide, eighteen inches of which had been saturated with Burnett's patent preparation, to the action of an extremely damp part of my cellar, from July last for about two months, open, and afterwards folded up and subjected to the pressure of an iron weight in the same place, but for some weeks under water which had found



its way into my cellar; on examining it recently I find the part perfectly saturated with the composition sound and good, but the part wholly free from the influence of the said composition rotten and easily torn. I therefore do not hesitate to record my most favorable opinion as to the value of the discovery, which seems effectually to destroy the principle of vegetation so productive of fermentation, and consequently of rot, or decay; and I think considerably lessening the probability of spontaneous combustion in sails or ropes on board of ships, unavoidably, at times, under the influence of wet or damp.

Yours truly,

W. WARD.

F. W. JERNINGHAM, Esq., Southampton.

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8, LOCKYER-TERRACE, PLYMOUTH,  
6th November, 1845.

DEAR SIR, — During three years' experience on the Coast of Africa, I have seen your prepared canvas tried in every form and shape, with the greatest success: in fact, I never saw a spot of mildew on prepared canvas (either in awnings or sails,) when I have frequently seen unprepared canvas completely covered with mildew in six or eight hours.

I have the honor to be, Sir, your obedient servant,

(Signed) JOHN SECCOMBE, *Lieut., R. N.,*

*Late of H. M. Ship "Espoir," serving on the Coast of Africa.*

To Sir WILLIAM BURNETT, K. C. H., &c., &c.

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"GREAT LIVERPOOL" STEAMSHIP,  
SOUTHAMPTON, 27th May, 1844.

SIR, — In compliance with your order to report on the sails of this ship which were made of "Burnettized" canvas, I have to inform you that a great part of the said sails have been in constant use for nearly three years, and that they have been frequently furled for fifteen or twenty days together, in head winds, and when at anchor; that not the slightest appearance of mildew has been observed while bent or in the sail-room, and that the canvas is in every other respect equal to that used for sails.

To Lieut. KENDALL, R. N.,

I am, Sir,

Superintendent Peninsula and  
Oriental Steam Navigation Company,  
Southampton.

Your obedient servant,

A. M'LEOD.

*Commander.*

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*Extract from a Note, dated the 29th March, 1845, from A. H. HOLDSWORTH, Esq., to Sir WILLIAM BURNETT.*

I wrote a few lines before I left London; I have now the pleasure of mentioning that I have just heard from Gordon, of the *Cormorant*, in which letter the following passage occurs: —

Pray make my compliments to Sir William Burnett, if you see him, and say nothing can have behaved better than his canvas. Our quarter-deck

awning, that had not been prepared by him, in *one night* became full of black spots, and in fact became completely mildewed. I then ordered one that had been prepared by his process to be brought on deck, to be wetted, and then rolled up, and kept in that state for *ten* days, exposed to a hot sun and heavy showers near the funnel; and, at the expiration of that time, it was dried, and found to be as good as when it came from the sail-loft.

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*Extract from an Official Report, dated Portsmouth Dockyard,  
24th September, 1847.*

SIR, — In obedience to your memorandum of the 23d instant, respecting the canvas that was rolled upon rollers, and has been deposited in the cellars of the hemp-house since April, 1839, we beg to report that we have carefully surveyed the said canvas, and find that one of the picces was prepared with Sir William Burnett's Solution, and the other unprepared. The latter is very much mildewed in every part, and in several places so rotten that it broke through on being removed from the roller, which was very much decayed; whereas the canvas prepared with Sir William Burnett's Solution is perfectly free from mildew, excepting a few small spots, which appear to have been caused by its being in contact with some particular fluid; and the sound state of the roller on which the prepared canvas was rolled, compared with the other, is very remarkable, it having been cut from the same spar.

We remain, Sir, your most obedient servants,

(Signed) CHARLES BROWN, Master Attendant.  
J. TAPLIN, Master Sailmaker.  
B. HARVEY, Master Rigger.

To the Admiral Superintendent, &c., &c., &c.

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## PREPARED CORDAGE.

JERUSALEM COFFEE-HOUSE, LONDON,  
12th May, 1842.

SIR, — I have to acknowledge the receipt of your letter of yesterday's date, requesting me to give my opinion of Sir William Burnett's Solution, for the preservation of rope, canvas, planks, &c.; a large quantity of each of these articles having been supplied in a prepared state to the late East India Ship Viscount Melbourne, lost in January last, in the China Sea.

It is with pleasure I give my testimony to the value of Sir William Burnett's Solution, having had ample opportunity to judge of its good effects, during a period of fifteen months, viz.: from October 1840, to January 1842, when my unfortunate ship was lost. I will briefly give my reason for judging thus favorably of it, viz.: —

1. ROPE. The Melbourne's rope was supplied and made by the same person, of the same description of yarn ; *one-half* was tarred in the usual manner, the *other half* was dipped in Sir W. Burnett's Solution. To give both kinds a fair trial, braces, buntlines, cluc garnetts, &c., were rove in opposition to each other. After several months had elapsed, the prepared was found to wear better than the tarred rope, and to have the additional advantage of being *much lighter*, easier to work, and causing *less* "chafing" to the sails. It is decidedly to be preferred for "running gear."
2. CANVAS. All the Melbourne's new sails and store canvas had been dipped in the Solution, which made them softer, consequently *lighter to work* than they would otherwise have been. There was not the least appearance of *mildew* during the voyage.
3. PLANKS. The launch was lined with planks prepared in the Solution already mentioned ; with the exception of one month, when her services were required for the ship, about thirty sheep were constantly kept in her, without the slightest detriment to the wood. This boat was the providential means of saving the lives of twenty-seven people, who were exposed in her to the elements for thirteen days, during which time they traversed 1,000 miles. I consider that the excellent *sound* state in which she was is to be attributed to her *planks for lining* having been prepared in Sir William Burnett's Solution ; and having had good cause to know its value, would strongly recommend it to the notice of all persons connected with shipping.

I have the honor to be, Sir,

Your most obedient, humble servant,

CHARLES W. M. S. M'KERLIE, late H.C.S.

*Commander late East India Ship Viscount Melbourne.*

To the Secretary for Sir W. Burnett's Patent.

14 MACFARLANE STREET, GLASGOW,  
12th February, 1844.

GENTLEMEN, — At your request we have much pleasure in certifying that, so far as our experience goes, your process of "Burnettizing" ropes has been very successful, rendering them much more pliable, and not nearly so liable to decay, wet having no injurious effect on them ; the same quantity of ropes now serving us, on an average, fully double the time they formerly did when unprepared.

We are, Gentlemen, your obedient servants,

(Signed)

THOMAS FRAME & Co.

*Wood Merchants.*

To Messrs. W. Middleton and Son,

68, Glassford Street, Glasgow, Agents for Sir W. Burnett's Patent.

## PROTECTION OF WOOLEN FROM MOTHS.

ADMIRALTY, 27th May, 1839.

SIR, — I beg to acquaint you that, on the 4th December, 1838, I placed several pieces of your prepared cloth and fur in a tin chest, containing some clothing much infested with the moth; upon examination, it appears that the cloths and fur, so prepared, are now in the same state as when first placed in the chest, *untouched by the moths*; indeed the insects appear to me to be *totally destroyed*, for nothing but the cases or skins remain in the chest, which I conceive can only be attributed to the effects of your preparation.

I have the honor to be, Sir, your most obedient, humble servant,

(Signed) THOS. MORTON.

To Sir W. Burnett, K. C. H., &c., &c.

## FURTHER TESTIMONIAL.

ADMIRALTY, 1st July, 1841.

SIR, — With reference to my Report to you of the 27th May, 1839, I have again examined the marine clothing (chiefly great-coats, articles the moths make great havoc with, and which were much affected with them,) contained in a tin chest in my custody, and amongst which clothing several pieces of your prepared cloths and fur were placed on the 4th December, 1838. I now find the cloths and fur so deposited remain untouched by moths, and they appear to me to be in the same state as when first deposited in the chest; and I have no hesitation in stating, that your prepared cloths have been the means of destroying the moths that were in the chest, previous to the introduction of your prepared cloths and fur.

I have the honor to be, Sir, your most obedient, humble servant,

(Signed) THOS. MORTON.

To Sir W. Burnett, K. C. H., &c., &c.

## SPECIFICATION

*Of the Patent granted, in England, to Sir William Burnett, Knight, Commander of the Royal Hanoverian Guelphic Order, of Somerset Place, Strand, in the County of Middlesex, for Destroying the Tendency of certain Vegetable and Animal Substances to Decay. Sealed July 26, 1838.*

To all to whom these presents shall come, etc., etc. Now know ye, that in compliance with the said proviso, I the said William Burnett, do hereby declare that the nature of my said invention, and the manner in which the same is to be carried into effect, are fully described and ascertained in and by the following description thereof, — that is to say: —



The invention consists in destroying the tendency of certain vegetable and animal substances to decay, by submitting them to the action of chloride of zinc. In preparing wood, canvas, cordage, sail-cloth, hemp, flax, wool, and other vegetable and animal matter, or articles made thereof, a tank or other vessel of wood or other suitable material is provided. This is to be filled about two-thirds full of chloride of zinc, dissolved in cold water, in the proportion of one pound of chloride of zinc to five gallons of water; this is allowed to remain for ten or twelve hours, when the solution will be ready. The material which is to be prepared is then placed in the solution, keeping it completely covered by the liquid. If wood or timber is to be prepared, it is to remain in the solution from ten to twenty-one days, according to its size and thickness; that is to say, if the timber be of the thickness of from eight to thirteen inches and upwards, it is to be immersed in the Solution for twenty-one days; if from four to eight inches thick, for fourteen days; and if less than four inches thick, for ten days. When the wood or timber has been so immersed it is to be taken out and placed in a situation sheltered from the weather until it becomes perfectly dry. In preparing canvas and cloth of hemp or wool, they are to be kept in the Solution for forty-eight hours, and then dried under cover; and, in this manner, other vegetable and animal materials of thin texture may be prepared. In the preparation of rope or cordage above the thickness of two inches, steep the hemp or yarns, of which the same is to be formed, in the Solution, forty-eight hours, and all rope or cordage of two inches or less is to be steeped in the Solution for seventy-two hours. In all cases, where tar is employed, the yarns forming the cordage should be placed in the Solution for forty-eight hours, and allowed to dry before undergoing the tarring process. In ship-building, and in building or repairing houses, besides preparing the timber to be used therein as above described, it is desirable to use a paint, made by grinding impure oxide of zinc (lapis-calaminaris) with oil or other suitable vehicle. This paint is recommended to be applied at the time the materials are brought into contact, to the faying parts of all scarfs, and on the joists and faying parts wherever else two pieces of timber are brought into contact, and also on the under-sides of the flats of all magazine platforms, and all other platforms, below the orlops of ships of the line, and lower decks of frigates, and below the upper decks of sloops and smaller vessels. In houses, the paint, made as before stated, is to be used for the inside of skirting and wainscoting of ground-floors, and upon every part of the timber materials below the external surface of ground floors.

In witness whereof, etc.

Enrolled January 21, 1839.

February 7, 1852. The patent to Sir William Burnett was extended for seven years, from July 26, 1852.

## SANITARY USES OF CHLORIDE OF ZINC.

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CHLORIDE of zinc is of great value as a sanitary and deodorizing agent; it is the most convenient and effective article yet discovered for removing unpleasant odors from the sick-room; and it is highly appreciated for that and other purposes by physicians and surgeons who are practically acquainted with its properties.

The following documents are reprinted from English publications.

*Copy of a Letter from SIR WILLIAM BURNETT, M. D., Director-General of the Medical Department of the Navy, to the SECRETARY OF THE ADMIRALTY.*

ADMIRALTY, 20th May, 1848.

SIR, — In consequence of the numerous reports, both written and verbal, which have been made to me during the few past years respecting the application of the Solution of chloride of zinc, as a disinfecting, or, at all events, as a deodorizing agent, I have been induced to request you will be pleased to lay the accompanying papers before my Lords Commissioners of the Admiralty, convinced that whatever tends to increase the comforts or to improve the moral and physical condition of all classes of men in Her Majesty's Naval Service, will meet with their Lordships most favorable consideration.

Presuming that the value of the chloride of zinc, as a preservative of vegetable fibre, is now established beyond all doubt, I may be permitted to call your attention to its effects when brought into contact with noxious gas in whatever way generated, or with putrid animal or vegetable substances evolving noxious odors, either of which, if indeed they be not chemically the same, can seldom exist for any length of time in ill-ventilated rooms or in densely populated districts, without producing disease, and frequently contagious diseases. The application of the fluid to correct the factor of bilge-water, is now in general use, both in vessels of war and merchant vessels, whether employed in the conveyance of goods or passengers, and it is admitted on all hands, with the most unquestionable success. In the Peninsular and Oriental Steam Navigation Company's vessels, the experiment was fairly tried, so far back as 1844, and with the happiest results. The same proof of its effects has been observed in her Majesty's ships *Rapid*, *Rhadamanthus*, *Childers*, *Fisgard*, *Stromboli*, *Imaum* and *Rosamond*.

In some of these vessels, and in others not herein mentioned, the effluvia had seriously affected the health of the people on board, causing, as in the Stromboli, oppressive headache, dyspepsia, and sleeplessness. Such was the relief obtained in the latter vessel that the honorable Captain Plunket has remarked, in a letter dated 22d January, 1845, that, were the Solution not allowed by government, he would provide it at his own cost. In the Rosamond, formerly the Eclair, the surgeon reports that the most trifling catarrhal complaints were frequently accompanied with a low typhoid form of fever until, by the copious use of the Solution, "a noisome fœtor," which existed on the fore orlop, or troop deck, had been removed.\*

The apparent effects of the Solution, in three line-of-battle ships in the Mediterranean, was still more remarkable. In two of these, — the Albion and Rodney, in which it was only sparingly used, — the effluvia from the after holds, in which there were salt provisions, and consequently leakage to a certain extent, was very disagreeable, while the smell from the bilgewater rendered the cockpit cabins scarcely habitable. In the Vanguard, in which it was used according to the directions given, the surface of all the timbers and planking in the hold being thoroughly imbued with it, there was little or no unpleasant effluvia, and the number of her sick were, in consequence, less numerous, and the diseases less severe, than in either of the two other vessels employed in precisely the same duties and localities.

In a communication from Commander Ryder, of a recent date, there is further evidence of the great advantages to be derived from a proper use of the Solution in steamers, particularly within the tropics, where disease is more apt to be engendered by the accumulation and decomposition of foreign matters in the holds of these vessels, such as indeed appears to have been the case in her Majesty's ship Growler, which was lately employed in conveying free negroes from the coast of Africa to the West Indies. The surgeon of that vessel states, that he considered the exciting cause of the fever which attacked the greater part of the crew, was the effluvia evolved from the accumulations in her holds and bilges, which (while she was being cleared out at Bermuda) was readily neutralized by the Solution, with the effect of thoroughly eradicating the disease.

The value of the Solution, as a sanitary agent, I think I may be permitted to state, has been established by the most unequivocal proofs. Noxious gases are speedily deprived of their more poisonous qualities in its presence, while the odors of corrupt or diseased animal substances, even if arising from a living body, are rendered impereceptible or innocuous, if not annihilated; these, there is every reason to believe, are not only frequently the direct source of fatal and malignant diseases, but they are chiefly instrumental in conveying the principles of contagion from one person to another, when from the debilitating influence of a tainted atmosphere they have acquired that property.

By a report lately presented to the Commissioners of Sewers, the Solution

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\* Vide Reports printed by Order of the House of Commons.



appears to have had a vast superiority over several other deodorizing agents employed in a series of experiments performed under their immediate inspection on cesspools and other receptacles of filth, with the view of rendering the removal of these matters less dangerous to the communities in their neighborhood. In proof of its efficacy under these or similar circumstances, and consequently of its power over those miasmata so fruitful of typhoid fever, I have already submitted for your consideration a number of documents, in which its beneficial effects were freely admitted, and in particular I took the liberty of directing your attention to one from the Chairman of the Board of Watford Union, and to another from the Governor of the Workhouse of that parish; and also to a communication from Dr. Lindsay to the Right Honorable Lord Auckland. These, however, form but a small portion of the documentary evidence now in my possession relative to the deodorizing properties of the Solution.

There is not, so far as I am aware, any means known by which a specific contagion may be made perceptible to the senses, in contradistinction to a fever-exciting miasm; if such an entity does really exist in a separate form, Professor Liebig supposes it most readily attaches itself to certain noxious gases, and by that means propagates the peculiar disease to which it belongs. These gases, however, as previously observed, are capable of being destroyed by the Solution, and it seems not unreasonable to infer the contagion also; but if this be not admitted, it is clearly demonstrable that, from the want of a proper vehicle of conveyance, it must be rendered at all events infinitely less diffusible. In this light, therefore, the Solution may be viewed as a disinfectant. The following documents bear more particularly on these points.

Several instances are reported, in which it was considered to have arrested or retarded the spread of contagious maladies. In September last, erysipelas began to infest the patients in the Royal Marine Infirmary at Woolwich; it speedily acquired considerable virulence, became contagious, and carried off several men who were under treatment for other ailments of minor importance. On this being reported, I caused the Deputy Inspector to adopt the usual precautions required on these occasions, and to cause the vapor of the Solution to be diffused throughout the wards by hanging up pieces of woollen cloth moistened with it, and by sprinkling it occasionally on the floors and bedding. In the course of a few days, after the employment of these measures, the spread of the disease was arrested, while all open sores, with which these patients were affected, put on a much more healthy appearance than they presented previously to the employment of the Solution. Early in 1848, the disease, in a malignant form, was again introduced to this establishment, from one of the ships in the river; still, by the constant use of the Solution, it was prevented from attacking other patients; even those with open buboes escaped — a circumstance so unprecedented as to lead to the conviction of the medical officer in its disinfecting properties.

In the Royal Marine Infirmary, at Chatham, typhus fever, introduced from Ireland, appears also to have been held in check by its being freely used in the wards; and a similar result, it was considered, occurred on board



the Barretto Junior transport, when crowded with troops on a passage to the West Indies.

The great benefit derived from the application of the diluted liquid to foul sloughing or cancerous sores, stands, however, on a more sure foundation. In the Imaum, it was used with the greatest benefit in the treatment of certain forms of ulcer. In cases of scrofulous ulcer, attended with an "overpowering odor," it was found, in the hands of E. Wilson, Esq., to have the effect not only of removing the bad smell, but of promoting a healthy process in the sores.

In the case of a child afflicted with perforation of the intestines, it was of essential service.

In the City of Dublin Hospital, its external application has been highly approved of.

I cannot conclude this letter without expressing my firm belief, that a more general use of an agent so innocuous in itself, and yet so powerful in the prevention of disease, is most urgently required in all hospitals or dwellings wherever typhus fever or other contagious diseases exist, as well as in emigrant ships, where it is at all times so difficult to enforce cleanliness, or dispel foul animal miasmata, even by proper ventilation.

(Signed) W. BURNETT, *Director-General, etc.*

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"UNITE," CONVICT SHIP, WOOLWICH,  
30th November, 1848.

SIR, — The cholera having happily ceased, we feel it our duty to bring to your notice the advantage resulting from the use of the chloride of zinc, as a destroyer of all foetid exhalations, and as one of the most powerful disinfectants with which we are acquainted. We used the Solution in the "Warrior" and the "Justitia" with good effect, but it was in the hospital-ship where we had the best opportunity of practically testing its great utility. This ship is remarkably well ventilated; and the chloride of lime has always been used; we therefore directed its discontinuance, and in its place used the zinc; we consider the advantages of the latter to be great and incontestible; it destroys all offensive effluvia more effectually than the former, leaving the atmosphere around free from all unpleasant smell, while the chlorine from the lime is, to many, peculiarly offensive. One patient, laboring under abscess of the lungs, was so offensive as to be scarcely approachable; the Solution removed all odors, and so contributed to the patient's comfort that he requested to be allowed to use it as a gargle and to wash the surface of the body with it. He declared that he found great relief from its use.

The patients were allowed to have either the lime or the zinc, as they liked, to sprinkle the bedding and place in the close stools, but they invariably preferred the zinc, stating that the odor of the lime was offensive, but the zinc had no unpleasant smell.

So strong is our opinion of its utility as a deodorizing agent, that we shall never cease to use it on all occasions when an agent of that kind is required,

and we recommend, most strongly, its general adoption in every department of the Couvict Establishment. In the naval service it is properly appreciated. To the mercantile marine it would be invaluable; for when offensive smells arise from a hold which cannot be cleansed, the free use of the Solution would remove all these, and at the same time preserve the woodwork of the ship, which we believe to be always undergoing decomposition, when noxious effluvia are evolved.

We are, etc.,

(Signed) G. H. DARBS, *Surgeon R. N., Medical Superintendent,  
Woolwich Convict Establishment.*

EDWARD NOLLOTH, *Surgeon, R. N.*

FREDERICK M. RAYNER, *Assistant Surgeon, R. N.*

H. P. VOULES, Esq., Superintendent of Convicts.

HER MAJESTY'S DOCK-YARD AT PORTSMOUTH,  
14th July, 1847.

SIR, — In reply to your memorandum of the 12th instant, wherein I am directed to report the effect of Sir William Burnett's fluid, when employed for the removal of noxious smells, such as bilge-water, or when employed as a disinfectant, if such has ever been the case; I beg leave to inform you that I witnessed its application in February, 1844, for the purpose of removing a more than ordinary stench of bilge-water and other offensive odors in the "Victoria and Albert" royal yacht, with most complete success. I am informed by the carpenter that she has remained comparatively sweet ever since, and when a bilge-water smell is occasionally perceptible, a slight application of the fluid removes it.

I have heard from some of the officers thereof that it has been used with remarkable benefit in several ships in ordinary for the same purpose.

I have ordered it for very disgusting privies, the effluvia from which it quickly neutralizes.

I have employed the fluid in a severe case of open cancer, the fœtor from which was intolerable to the patient and attendants; this it destroyed so long as the dressings were kept moist therewith.

I have witnessed the use of, and employed the fluid as a preservative of specimens of morbid anatomy, and found it just as good as spirits of wine.

I have tried various experiments on a small scale, on noxious gases and offensive odors, with, in every instance, perfect success, from which, and the efficacious results in the before-mentioned instances, there can be no doubt of the fluid possessing potent powers as a corrector of noxious and disagreeable odors; moreover, if sufficiently applied, and kept for a short space of time, so as to permit the timber to imbibe some of it, I am convinced that the fluid will not only correct the bilge-water smell, but have a resisting effect to its future formation.

I have, etc.

(Signed) JAMES HENDERSON, *Surgeon.*

HYDE PARKER, Esq., C. B., Admiral Superintendent, etc., etc.

*Relative Merits of the Chloride of Zinc and Chloride of Lime as tested in the "Lord Auckland" Convict Ship. Extracted from the Journal of the "Lord Auckland," March, 1847.*

The chloride of lime I have always used very extensively, and although it has counteracted disagreeable smells by creating one of its own, I have never found it so beneficial or lasting in its properties as the chloride of zinc. In the first place, the effluvium arising from the former application is anything but pleasant; and, so soon as the smell of chlorine has ceased to pervade the apartment, I have invariably found that the noxious smells become as prevalent as ever; indeed, a few hours after its use, we have had the disagreeable smells from the closets descending the prison deck; and although used twice a day, morning and evening, and then scrubbed into the wood-work and left wet with the liquid, it has not been a sufficient safeguard against the strong urinous and other smells from the round-houses.

With the chloride of zinc there is no unpleasant smell whatever from its solution; it not only eradicates the fætor from close and confined places, but produces a sweetness and an agreeableness of the air between decks; the lasting properties of one application keeps everything pure for forty-eight hours, which I could never obtain by the chloride of lime. And although I have been in the habit of using both remedies in different vessels, even before the application of the latter (chloride of zinc,) at the appointed time in the morning, we seldom or ever found any unpleasant smell to warrant such a washing or sprinkling; but with the former, (chloride of lime,) its effects were gone in a few hours.

(Signed) BENJAMIN BYNOE, Surgeon R. N.

SANITARY PURPOSES AND METHOD OF APPLICATION, AS  
RECOMMENDED IN ENGLAND.

<i>Objects.</i>	<i>Mode of Applying the Fluid.</i>	<i>Proportion of Mixture.</i>
To purify Sick Rooms, and the Wards of Hospitals, Work-houses, Prisons, Factories, and Crowded Places, the between-decks of Ships, etc.	Moisten, with the diluted solution, a piece of flannel cloth, attached to a long rod, and wave it through the air of the apartment for ten minutes at a time; in addition to which, the floor should be mopped or sprinkled over with the same, if necessary, several times a day, and a small quantity of the same dilute solution should be put into the close-stools and bed-pans. The water-closets should also be cleansed with it, and a couple of gallons occasionally thrown down each. . . . .	Fluid. Water.  1 to 40
	N. B. <i>For use on board ships, between decks, and in places where, from imperfect means of ventilation, it may be inconvenient to wet the floors.</i> Moisten, with the diluted solution, thick pieces of flannel cloth—the thicker the better—and wave them through the air of the apartments for ten minutes, and then suspend them in the most convenient manner to the deck-beams, or across the rooms, and keep other similar pieces of cloth thoroughly and repeatedly saturated with the same solution, in flat dishes upon the floors. It is essentially necessary that the bilge-water in the hold of the vessel should be purified agreeably to the instructions given below.	
To Purify Fever Wards in cases of death.	When a patient dies of fever, the body should be sponged over with the dilute solution, and the clothes and bedding should be immersed and kept in a sufficient quantity of it, for forty-eight hours before being washed. The floor should be well mopped over with the solution. Flannel, moistened with it, (as before recommended,) should be waved through the room. . . . .	1 to 40
To Purify the Clothes, Linen, etc., of sick persons.	Immerse the articles in the dilute solution, as directed in sick rooms. . . . .	1 to 40
To prevent the communication of Infectious Disease.	Sprinkle the dilute solution over the whole of the floor of the apartment, and very slightly on the coverlid of the patient's bed. The clothes used should be immersed in the solution, and afterwards thoroughly dried. Moisten pieces of flannel cloth, and use them as directed above.	1 to 40
To purify the odor of Night-chairs.	Put half a pint of the dilute solution into the pan previous to its use, and when emptied, rinse it out with a small quantity. . . . .	1 to 40
To disinfect dead bodies, and purify apartments preparatory to the visits of Searchers, Undertakers, and Jurymen, and in cases of Post-mortem Examination.	Wash the body occasionally with the dilute solution, which will remove all unpleasant smell and retard putrefaction. . . . .	1 to 40
To prepare and arrest the decomposition of Subjects for Dissection.	Immerse the subject in the dilute solution, and let it remain about two hours: after which time it will be purified. As the dissection proceeds, the parts should be sponged over with the same; and, if they are to be preserved, the blood-vessels should also be injected with the solution. . . . .	1 to 40



<i>Objects.</i>	<i>Mode of Applying the Fluid.</i>	<i>Proportion of Mixture.</i>
To disinfect Cesspools, Drains, Water-closets, etc.	Pour in a quantity of the solution in proportion to the capacity of the receptacle. For ordinary water-closets, one gallon of the dilute solution will generally be effectual. For large cesspools, the quantity must be increased in proportion to their contents. . . . .	Fluid. Water. 1 to 20
To purify Larders and Stables.	Sprinkle the floor and wash all the wood-work with the dilute solution. . . . .	1 to 20
To sweeten musty Casks, Tubs, etc.	Rinse them well with the dilute solution. . . . .	1 to 20
To destroy Canker and Fungus in Trees.	Apply the solution carefully with a brush to the parts affected only. . . . .	1 to 40
To extirpate Bugs and other Vermin.	Wash the floors and all the crevices with the dilute solution. . . . . The joists, etc., of the bedsteads should be moistened by a brush with a solution consisting of one part of fluid to five parts of water.	1 to 20
To purify Bilge-water and the holds of Ships.	The quantity to be used at a time is twenty gallons of the dilute solution for each hundred tons of the ship's measurement. It should be poured into the air-holes of the ship, so that it may find its way by the limber-holes into the well; and it should be thrown by a small engine into places where it may be inconvenient to introduce it by other means. A portion may also be poured down the ship's pumps, the boxes being previously removed to allow of its free passage below. The solution should be allowed to remain in the ship twenty-four hours. At the expiration of that time the ship should be pumped as dry as possible, the well thoroughly cleansed and washed with the solution, and the operation repeated as occasion may require. . . . .	1 to 20

N. B. When floors and other wood-work are washed with the Solution, it should not only be freely applied, but well rubbed into all parts of the wood; and the use of soap or soda should be avoided immediately before or after its application.

# LOVIS, HODGES & SILSBEE,

MANUFACTURERS, IMPORTERS, AND DEALERS IN

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**SOUTH BOSTON,**

FOR THE MANUFACTURE OF

Logwood, Hyperic-Eustic, and Light Bark Liqueur.	Chloride of Zinc.
Cut and Bolted Dye Woods.	Iron Liqueur.
Extract of Logwood.	Red Liqueur.
Purified Carbonate of Soda.	Acetate of Lime Liqueur.
Prepared Soda Ash.	Liqueur Ammonia fort.
Dunging Salts.	Aqua Ammonia, any Strength.
Preparing Salts.	Spirit of Ammonia.
Scouring Salts.	Spirits of Nitre.
Silicate of Soda. (Patented 1855.)	Vinegar, and Strong for Manu- facturers' use.
Sugar of Lead.	Acetic Acid.
Tin Crystals.	Muriatic Acid.
Muriate of Tin Liqueur.	Nitric Acid.
Oxymuriate of Tin Liqueur.	Red Prus. Potash Powders, &c.

Also, constantly on hand and for sale at Store,

Alum.	Woad.	Turmeric.
Blue Vitriol.	Soda Ash.	Cutch.
Copperas.	Sal Soda.	Gambier.
Bi Chrom. of Potash.	Caustic Soda.	Sumac.
Prussiate of Potash.	Argols.	Cudbear.
Red Prus. of Potash.	Oxalic Acid.	Cochineal.
Indigo.	Tartaric Acid.	Starch.
Madders.	Nitrate of Lead.	Oils, Etc., &c.

### REFERENCES.

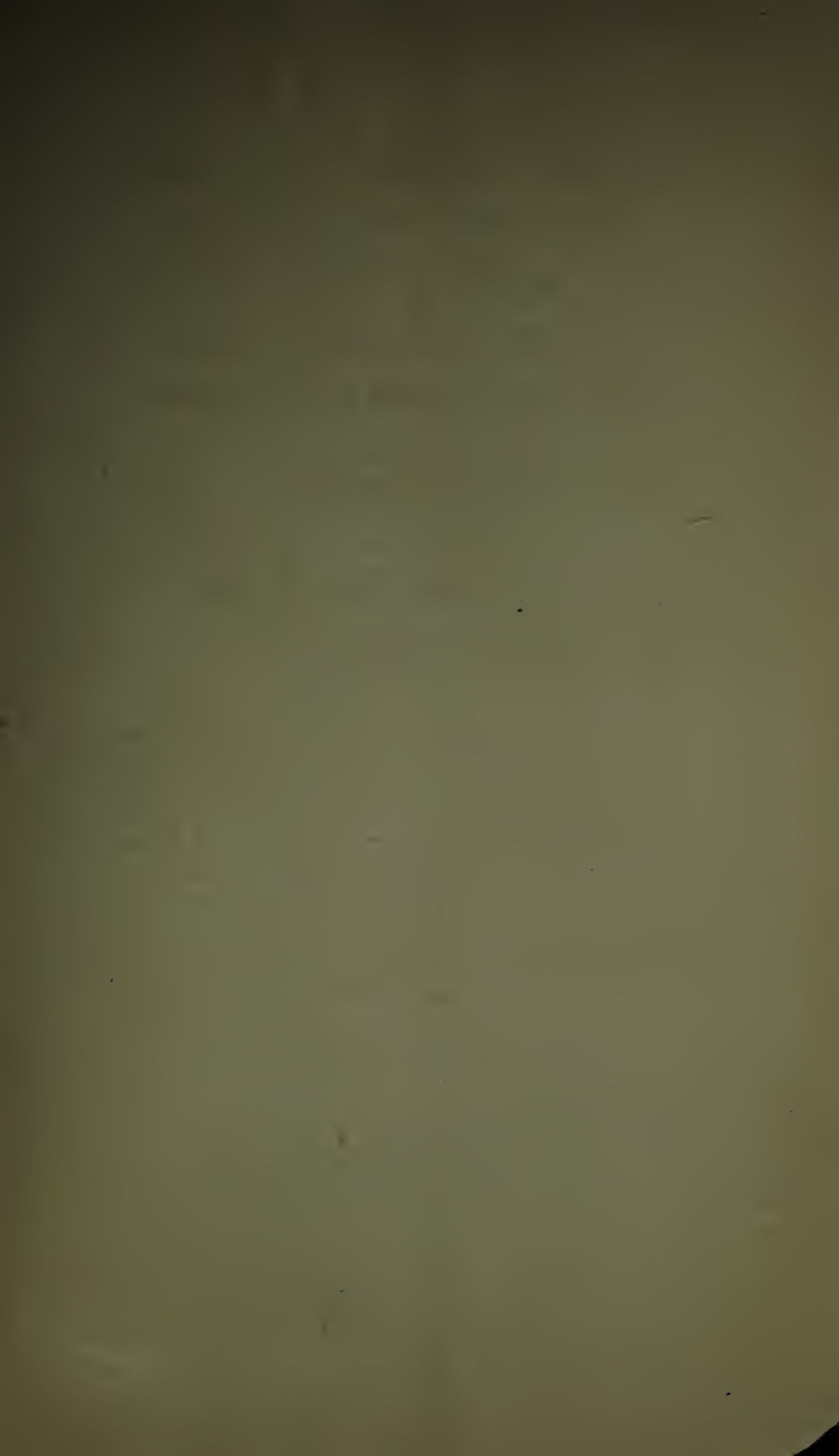
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HON. NATHANIEL SILSBEE.

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**MATTAPANNOCK CHEMICAL**  
**AND**  
**BURNETTIZING WORKS,**

**First and Second, corner of C Streets,**  
**SOUTH BOSTON;**  
**Lovis, Hodges & Silsbee,**  
**PROPRIETORS.**

**OFFICE, 63 & 67 WATER STREET,**  
**BOSTON.**

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**SHIPS' SPARS,**  
*Not over Sixty Feet long,*  
**CAN BE BURNETTIZED AT OUR WORKS.**

**CHLORIDE OF ZINC,**  
Manufactured and for Sale, in any quantity, in the form  
of a Concentrated Solution.